



A preliminary taxonomic account of the family Araceae in Rajshahi district of Bangladesh

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General Note

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ABSTRACT

The present research focused on the family Araceae of Rajshahi district was carried out from July 2013 to August 2014. A total of 13 species under 11 genera belonging to the family Araceae were collected and identified. Out of the total number of species, i.e. *Alocasia indica* (Roxb.) Schott., *Amorphophallus campanulatus* (Roxb.) Bl. ex Decne, *Colocasia esculenta* (L.) Schott., *Colocasia gigantea* (Blume) Hook. f., *Epiremnum pinnatum* (L.) Engl., *Pistia stratiotes* L., *Typhonium trilobatum* (L.) Schott., *Xanthosoma violaceum* Schott. were common and *Caladium bicolor* (Ait.) Vent., *Caladium humboldtii* Schott., *Syngonium macrophyllum* Engl., *Acorus calamus* L., *Monstera deliciosa* Lieb. Med., was rare species in the study area. For each species, the nomenclature has been

brought updated and the synonyms, local name, English name, habit, habitat, flowering time, chromosome number, taxonomic description, medicinal uses and distribution have been provided.

Keywords: Preliminary Assessment, Aroids, Taxonomy, Rajshahi, Bangladesh

1. INTRODUCTION

The Araceae are a family of monocotyledonous flowering plants in which flowers are borne on a type of inflorescence called a spadix. The spadix is usually accompanied by, and sometimes partially enclosed in, a spathe or leaf-like bract. Also known as the arum family, members are often colloquially known as aroids. This family of 114 genera and about 3750 known species is most diverse in the New World tropics, although also distributed in the Old World tropics and northern temperate regions (Christenhusz and Byng, 2016).

A family of 115 genera and over 2000 species, Araceae are distributed mostly in tropical and some also in temperate regions of the world. About 25 genera and over 140 species have been reported from India, chiefly from western and southern parts. Some larger genera along with the number of their world over reported species are *Anthurium* (500), *Phylodendron* (275), *Arisaema* (150), *Ammorphophallus* (100), *Rhaphidophora* (100), *Pothos* (75), *Alocasia* (70), *Monstera* (50), *Arum* (15), *Colocasia* (8), *Acorus* (2) and *Pistia* (1). *Colocasia* (*Colocasia antiquorum*) and money plant (*Pothos aureus*) are two famous plants of Araceae (Sharma, 2004). The family Araceae consists of about 110 genera and 2500 species (Croat, 1979), the vast majority of them tropical and subtropical. In Bangladesh, it is represented by 30 genera and 89 species (Ahmad *et al.*, 2007).

The importance of studying local floristic diversity and medicinal uses has been realized and carried out in Bangladesh by Alam *et al.* (2006), Ara *et al.* (2011, 2013), Khan and Afza (1968), Khan and Banu (1972), Khan and Hassan (1984), Khan and Huq (2001), Rahman *et al.* (2006), Rahman *et al.* (2007a, 2007b, 2007c), Rahman *et al.* (2008a, 2008b, 2008c, 2008d), Rahman *et al.* (2010, 2011, 2012), Rahman (2013a, 2013b, 2013c, 2013d, 2013e, 2013f, 2013g, 2013h, 2013i, 2013j, 2013k), Rahman *et al.* (2013a, 2013b, 2013c, 2013d), Rahman and Akter (2013), Rahman and Khanom (2013), Rahman (2014), Rahman *et al.* (2014a, 2014b), Rahman and Gulshana (2014), Rahman and Rahman (2014), Rahman and Rojonigondha (2014), Rahman *et al.* (2015), Islam *et al.* (2009), Khan and Huq (2001), Khan *et al.* (1994), Rahman *et al.* (2013), Uddin and Hassan (2010), Arefin *et al.* (2011) and Uddin *et al.* (2014). The main objective of this work was to make on the preliminary taxonomic account of the family Araceae occurring Rajshahi, Bangladesh.

2. MATERIALS AND METHODS

Study area

Rajshahi district is a district in north-western Bangladesh. It is a part of the Rajshahi division. The Rajshahi district is bounded by Naogaon district to the north, Natore district to the east, and Chapai Nawabganj district and the river Padma to the south. The Rajshahi district has a sub-tropical monsoon climate, typical of Bangladesh, which falls within a low rainfall zone of the country. 75 percent rainfall occurs during June-September. The annual rainfall is 1350 mm. Temperature of the area is low in January varies from 9.0°C to 14.1°C. From February an increasing trend of temperature is found up to April and thereafter temperature start to decline. In April temperature varies from 22.6°C to 36.9°C. The mean relative humidity is found to be low in March (65%) and high in July-September (88-89%) (BBS, 2009).

Methodology

The present study is based on the intensive field of the area during the period of July 2013 to August 2014. A total of 13 species under 11 genera belonging to the family Araceae were collected and identified. All the species were noted and time to time the areas were visited to see when they flowered. For the morphological study, different types of species were examined again and again in order to see if there was any variation or not. They were collected at flowering stages and herbarium specimens were prepared as vouchers. In this practice standard method was followed. In this regard different types of plant species were collected from different habitats. The plant specimens were identified by consulting different Floras and literatures, viz, Ahmed *et al.* (2007), Hooker (1961), Prain (1963), Kiritikar and Basu (1987) and by comparing with the herbarium specimens available at the Herbarium, Department of Botany, Rajshahi University. For updated nomenclature of the species Ahmed *et al.* (2007), Huq (1986) and Pasha and Uddin (2013). Voucher specimens are deposited in the Herbarium, Department of Botany, Rajshahi University, Bangladesh.

3. RESULTS AND DISCUSSION

In the present investigation, a total of 13 species under 11 genera of the family Araceae were recorded for Rajshahi district. For each species, the nomenclature has been brought updated and the synonyms, local name, English name, habit, habitat, flowering time, chromosome number, taxonomic description, medicinal uses and distribution have been provided. Based on the study, a preliminary list of the family Araceae of Rajshahi, Bangladesh conducted during July 2013 to August 2014. The collected information is comparable with the result of other studies in Bangladesh. A total of 6 species belonging to 6 genera were recorded in Gazipur district (Alam *et al.*, 2006). A total of 2 species belonging to 2 genera are documented in Khagrachhri district (Islam *et al.*, 2009). A total of 12 species belonging to 10 genera are recorded in Tekhnaf (Uddin *et al.*, 2013). A total of 8 species belonging to 6 genera were recorded in Lawachara National Park (Uddin *et al.*, 2010). A total of 5 species belonging to 5 genera are recorded in Munshiganj district (Rahman *et al.*, 2013). So far the information available, no published data recorded on the family Araceae at Rajshahi in Bangladesh.

By examining the plant materials collected from the study area using the identification methods and medicinal information was accumulated and described below.

3.1. *Acorus calamus* L. Sp. Pl.: 324 (1753).

Synonyms: *Acorus calamus* var. *vulgaris* L. (1753), *Acorus calamus* var. *verus* L. (1753).



Figure 1 *Acorus calamus* L.

Local name: Bach, Mithabach, Gharbach

English name: Sweet Flag

Habit: Herb

Habitat: Marshy, open places at higher elevations.

Flowering time: April to August

Chromosome number: $2n = 36$ (Peterson, 1989).

Distribution: North and Central America, Europe and Asia. In Bangladesh, it was collected from Rajshahi, Chittagong and Cox's Bazar districts and has been planted in many gardens (Ahmed *et al.*, 2007).

Brief taxonomic description: It is an aromatic marsh herb, with creeping, branching, rhizome. Leaves distichous, ensiform about 1 m high. Peduncle leaf-like; spathe the ensiform continuation of the peduncle; spadix sessile, 5-10 cm long, cylindric, dense-flowered; flowers minute.

Medicinal uses: The taste of the rhizome is pungent, bitter and heating. It is used as emetic, laxative, diuretic, carminative, expectorant, alexiteric, emmenagogue and anthelmintic, and helps to improve memory, appetite and voice. It serves as a tonic for the brain and also helps to cure diseases of the mouth and throat. It is useful in abdominal pain, inflammation, fever, epilepsy, bronchitis, delirium, asthma, hysteria, tumours, rat-bite, worms in the ear, pains in the liver and the chest, kidney troubles, leucoderma, general weakness, toothache and chronic diarrhea in children (Ahmed *et al*, 2007).

3.2. *Alocasia indica* (Roxb.) Schott.

Synonyms: Not known.



Figure 2 *Alocasia indica* (Roxb.) Schott.

Local name: Mankachu

English name: Giant Taro

Habit: Herb

Habitat: Village shrubberies, banks of flowing streams, low-lying marshy areas and shades of trees and plantations.

Flowering time: July to October

Chromosome number: $2n = 28$ (Peterson, 1989).

Distribution: India through Southeast Asia and the pacific Islands. In Bangladesh, it is very common and found throughout the country (Ahmed *et al*, 2007).

Brief taxonomic description: A robust herb with long, cylindrical caudex, up to 1.8 m. Leaves large 60-90 cm long, triangular-sagittate. Peduncle shorter than the petiole, spathe 20-30 cm, pale yellow, spadix equaling the spathe.

Medicinal uses: Leaf juice is astringent and is used against tumours and insect stings. Tuberis used in rheumatism, anasarca, jaundice, leprosy and diseases of abdomen and spleen. It also acts as a mild laxative and diuretic. Ash obtained by burning the tuber is applied in a thin layer to cure lacerations and infections of the tongue and the mouth (Ghani, 2003).

3.3. *Amorphophallus campanulatus* (Roxb.) Bl. ex Decne

Synonyms: Not known.



Figure 3 *Amorphophallus campanulatus* (Roxb.) Bl. ex Decne

Local name: Olkachu

English name: Elephant yam

Habit: Herb

Habitat: Damp and moist places under the shades of trees, forest areas and plantations.

Flowering time: May to November

Chromosome number: $2n = 28$ (Peterson, 1989).

Distribution: Sri Lanka, India, Myanmar and Java (Indonesia). In Bangladesh, It is very common and found all over the country (Ahmed *et al*, 2007).

Brief taxonomic description: An annual herb with large, depressed-globose, much-warted tubers, 20-25 cm diam. Leaves solitary, 30-90 cm broad, 3-partite, segments pinnatisect, appearing long after the flowers. Spathe 15-23 cm across. Spadix very stout; female inflorescence cylindric, male subturbinate, appendage dark-purple. Berries ovoid.

Medicinal uses: The tuber acts as appetizer, stomachic and tonic, and is used in the treatment of abdominal pains, tumours, asthma, bronchitis, vomiting, elephantiasis, piles, acute rheumatism, diseases of blood and enlargement of the spleen. Aerial parts of the plant used in earache, swelling of throat, pimples, cholera, diarrhea, pain, puerperal fever, kala-azar, neuralgia and bites of poisonous insects. Roots are emmenagogue, and used in boils and ophthalmia (Ghani, 2003).

3.4. *Caladium bicolor* (Ait.) Vent

Synonyms: *Arum bicolor* Ait., *Caladium adamnatinum* Linden.



Figure 4 *Caladium bicolor* (Ait.) Vent

Local name: Not Known

English name: Fancy leaved Caladium

Habit: Herb

Habitat: Shady moist areas of the forest floor.

Flowering time: April to June

Chromosome number: $2n = 28$ (Peterson, 1989)

Distribution: South America, from Panama to Bolivia and eastward to the Atlantic coast of Brazil. Naturalized throughout the tropics (Madison, 1981).

Brief taxonomic description: Terrestrial tuberous herb, tuber starchy, fully subterranean or with the apex at soil line, flattened, sub-globose or sub cylindric, 2-12x 2.5-6.0 cm, white or yellowish within. Leaves several, erect, petiole 30-95 cm long, 4-8 mm thick, sheathing in the lower part, green or marked with small purplish or reddish striations, with a glaucous surface, lamina peltate, ovate to elliptic, 12-40x 9-26 cm, the posterior lobes round, usually strikingly variegated with shades of green, white and red, glaucous

beneath. Inflorescence solitary or borne two or three together, peduncle equaling the petioles, erect. Fruit a berry, whitish, many seeded. Seeds subovoid.

Medicinal uses: The plant is widely used for ornamental purposes.

3.5. *Caladium humboldtii* Schott.

Synonyms: *Caladium myriostigma* C. Koch, *Caladium humboldtii* var. *myriostigma* (C.Koch) Engler.



Figure 5 *Caladium humboldtii* Schott.

Local name: Not Known

English name: Not Known

Habit: Herb

Habitat: Shady moist places

Flowering time: Not Known

Chromosome number: $2n = 19$ (Peterson, 1989)

Distribution: Brasil and Venezuela. In Bangladesh, the species is cultivated all over the country (Ahmed *et al*, 2007).

Brief taxonomic description: Terrestrial herb, tuber globose, 1-2 cm in diameter, yellow within, suckering freely. Leaves several, erect, petioles terete, 10-24 cm x 1.0-1.5 mm, leaf blade ovate, small, membranaceous, peltate, with sagittate base, 5-9 and spots above, paler below.

Medicinal uses: The plant is widely used for ornamental purposes in public places and homesteads.

3.6. *Colocasia esculenta* (L.) Schott.

Synonyms: *Arum esculenta* L., *Arum colocasia* L.

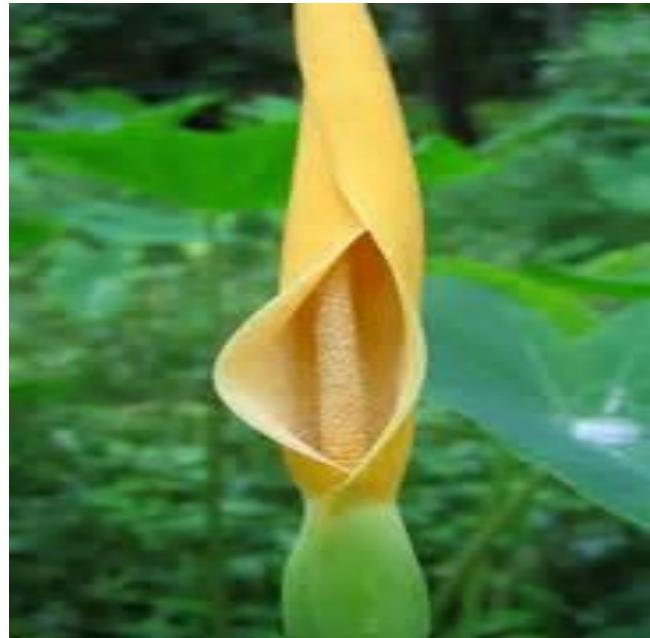


Figure 6 *Colocasia esculenta* (L.) Schott.

Local name: Kochu

English name: Taro

Habit: Herb

Habitat: Sides of streams, ditches, water logged low lying areas, paddy fields, shady secondary forests and plantations.

Flowering time: May to October

Chromosome number: $2n = 28$ (Peterson, 1989).

Distribution: Pan-tropical. In Bangladesh, it is very common and found throughout the country (Ahmed *et al*, 2007).

Brief taxonomic description: Tall herb with underground tuberous stem. Petiole erect, up to 1.2 m. long; lamina peltate-ovate, cordate at the base, up to 50 cm. long. Spathe pale yellow, 15-35 cm long; spadix much shorter than the spathe.

Medicinal uses: Juice of leaves and roots is used in cancer of the nose and warts. Leaves and raw corms cause severe irritation in the mouth. Juice of the petioles is used as a styptic or astringent, stimulant, and rubefacient and also in athlete's feet. Corm juice is a trypsin inhibitor and also used in alopecia and scorpion sting (Ghani, 2003).

3.7. *Colocasia gigantea* (Blume) Hook. f.

Synonyms: *Caladium giganteum* Blume, *Leucocasia gigantea* (Blume) Schott.



Figure 7 *Colocasia gigantea* (Blume) Hook. f.

Local name: Salad Kachu, Moulovi Kachu

English name: Giant Elephant Ear

Habit: Herb

Habitat: Shady places, roadsides and gardens

Flowering time: April to September

Chromosome number: $2n = 28, 42$ (Petersen, 1989)

Distribution: Native of South China and Indo-China to the Malay Peninsula and Sumatra and Java of Indonesia. In Bangladesh, it is cultivated all over the country (Ahmed *et al.*, 2007).

Brief taxonomic description: Perennial evergreen herb with a stout short above-ground stem, creeping to decumbent clothed with marcescent leaf bases 20-50 cm long, 4-6 cm in diameter, stolons 2-4, trailing horizontally, branching, thin, pale green, 30-40 cm long, 0.4-0.5 cm in diameter.

Medicinal uses: The petioles and leaves of the plant are rich in iron, calcium and Vitamin C. In Bangladesh, children and women generally suffer from a deficiency of iron, calcium and vitamin C and, as such, the plant may be consumed as a supplement. The plant can be cultivated in kitchen gardens for ready availability. It is also cultivated for its edible petioles (Hotta, 1970).

3.8. *Epipremnum pinnatum* (L.) Engl.

Synonyms: *Pothos pinnata* L., *Rhaphidophora pinnata* (L.) Schott.



Figure 8 *Epipremnum pinnatum* (L.) Engl.

Local name: Money plant

English name: Devil's Ivy, Golden Pothos

Habit: Climber

Habitat: Creeping on trees or on stone walls in shady and moist situations in the tropical rain or deciduous forest.

Flowering time: April to May

Chromosome number: $2n = 60$ (Petersen, 1989)

Distribution: Southeastern Asia through Malesia and into Oceania. In Bangladesh, it has been reported wild in the Tamabil-Jafflong forests of Sylhet district and is also cultivated all over the country (Ahmed *et al.*, 2007).

Brief taxonomic description: Epipremnum Pinnatum has shiny heart-shaped leaves and long slender stems, which can grow up to 2m in length. However, the stems can be wound round sticks or attached to supports to keep the plant from taking up too much space. The plant typically stands at a height of between 4m and 8m and has a total spread of 1m to 1.5m. Epipremnum Pinnatum produces small green flowers in summer.

Medicinal uses: Not known.

3.9. *Monstera deliciosa* Lieb. Med.

Synonyms: *Monstera borsigiana* Engler.; *Monstera tacanaensis* Matuda.



Figure 9 *Monstera deliciosa* Lieb. Med.

Local name: Not Known

English name: Swiss Cheese Plant.

Habit: Climber.

Habitat: Shady areas.

Flowering time: March to October.

Chromosome number: $2n = 24, 48, 56, 60, 70$ (Petersen, 1989).

Distribution: Mexico, Guatemala, Costa Rica and Panama (Madison, 1977). In Bangladesh, it is found all over the country (Ahmed et al, 2007).

Brief taxonomic description: This member of the arum family Araceae is an epiphyte with aerial roots, able to grow up to 20 m (66 ft) high with large, leathery, glossy, heart-shaped leaves 25–90 cm (10–35.5 in) long by 25–75 cm (10–29.5 in) broad. Young plants have leaves that are smaller and entire with no lobes or holes, but soon produce lobed and fenestrate leaves.

Medicinal uses: The fruit of *Monstera deliciosa* is edible when ripe and takes a yellow colour with a detectable aroma. Before full maturation, the outer bluish-green skin of the fruit contains tricho-scleroids which cause irritation to mouth and throat. Taste of the fruit is comparable to banana and pineapple fruit salad. The fruits are sold commercially as Ceriman in Mexico (William, 1991).

3.10. *Pistia stratiotes* L.

Synonyms: *Zala asiatica* Lour., *Pistia minor* Blume.



Figure 10 *Pistia stratiotes* L.

Local name: Topapana

English name: Water lettuce, Tropical duckweed

Habit: Aquatic herb

Habitat: Surface of ponds, ditches, slow-running streams and irrigation canals.

Flowering time: October to March

Chromosome number: $2n = 28$ (Peterson, 1989).

Distribution: Tropics and subtropics but rare in Oceania. It is found almost everywhere in Bangladesh (Ahmed *et al.*, 2007).

Brief taxonomic description: A floating, stemless, stoloniferous herb; roots of tufted simple, white fibres. Leaves 3.2-10 cm long, variable in breadth, obovate-cuneate, rounded or retuse at the apex, densely pubescent on both surfaces. Spathe about 13 mm long, obliquely campanulate, white, gibbous and closed below, contracted about the middle, dialated and nearly orbicular above.

Medicinal uses: The leaves of the plant possess antiseptic, antitubercular, antidysenteric and anthelmintic properties, and are used for the treatment of eczema, leprosy, piles, ulcers, syphilis, cough and asthma. Roots of the plant contain laxative and diuretic properties (Yusuf *et al.*, 1994).

3.11. *Syngonium macrophyllum* Engl.

Synonym: Not Known.



Figure11 *Syngonium macrophyllum* Engl.

Local name: Not Known.

English name: Arrowhead Vine.

Habit: Climbing herb.

Habitat: Shady and damp areas.

Flowering time: June to August.

Chromosome number: Not Known.

Distribution: Mexico to Equador (Croat, 1981). It is found almost everywhere in Bangladesh

Brief taxonomic description: A large evergreen climbing herb. Juvenile plants with glaucous stem, internodes 0.8-5.2 cm long, usually scandent. Leaves petiolate, petioles 7-25 cm long, glaucous. Inflorescence 4-8 per axil, peduncles almost terete, erect, 10-13 cm long at anthesis. Seeds obovoid, white before maturity, becoming dark grey.

Medicinal uses: In Belize, roots and bark used in traditional medicine for treatment of superficial and deep wounds. In Central American, used for various skin disorders (Croat, 1981).

3.12. *Typhonium trilobatum* (L.) Schott.

Synonyms: *Arum trilobatum* L., *Arum orixense* Roxb. ex Andr.



Figure 12 *Typhonium trilobatum* (L.) Schott.

Local name: Ghetkochu

English name:

Habit: Herb

Habitat: Damp moist places.

Flowering time: April to October

Chromosome number: $2n = 18$ (Kumar and Subramaniam, 1986)

Distribution: From Nepal to Southeast China, north Makaysia and Sri Lanka. Introduced in the Philippines, west Borneo, Singapore, West Africa (Ivory Coast) and the Neotropics. In Bangladesh, it is found all over the country (Ahmed *et al.*, 2007).

Brief taxonomic description: A tuberous herb, with subglobose tuber up to 4 cm diam. Petiole 25-30 cm long; lamina hastate-subtrisect, segments all acuminate, front segment ovate, 8-18 cm long, lateral ones obliquely ovate, shorter, subbilobed at base. Peduncle thin, 5-7 cm long; tube of spathe oblong, 2.5 cm long, lamina oblong-ovate-lanceolate, acuminate, 15 or more cm long, 5-7 cm broad, inside rose-purple. Spadix nearly 15 cm long. Female inflorescence short-cylindric, about 7 mm long; male inflorescence 1.25-1.5 cm long, rose-pink, situated above the female.

Medicinal uses: Both tuber and root of the plant are acrid and a stimulant when fresh. These are used to cure piles. In case of tumours, the tuber is used as a poultice. The tuber serves as a good medicine to cure diseases of the stomach if taken along with bananas. It is also an effective drug in case of venomous snake bites when applied externally and internally (Ghani, 2003).

3.13. *Xanthosoma violaceum* Schott.

Synonyms: *Xanthosoma nigrum* Stell., *Arum nigrum* Vell.



Figure 13 *Xanthosoma violaceum* Schott.

Local name: Dudhkachu

English name: Blue Taro

Habit: Herb

Habitat: Shady moist places and village thickets.

Flowering time: April to October

Chromosome number: Not known

Distribution: The West Indies and South America. In Bangladesh, it found almost everywhere in the country (Ahmed *et al.*, 2007).

Brief taxonomic description: Terrestrial perennial herb. Rhizome large and tuberous, hypogea, short and thick. Leaves petioles 30-70 cm long, 1-4 cm broad at the base, long-vaginate, brownish-violaceous, leaf blades at first somewhat pruinose, becoming green, paler beneath, sagittate-ovate, 20-50 cm long and 15-45 cm wide or larger. Peduncles 15-20 cm long. Ovaries short ovoid.

Medicinal uses: The Mayna Jivaro tribal people of Peru use the leaves as a pain reliever, especially to treat rheumatic pain in the legs. The juice from the split peduncle of the plants is used to cure itchy skin and the juice from the split fruits is used to remove tapeworms from the skin of dogs (Croat, 1994).

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